

Fig. 3a

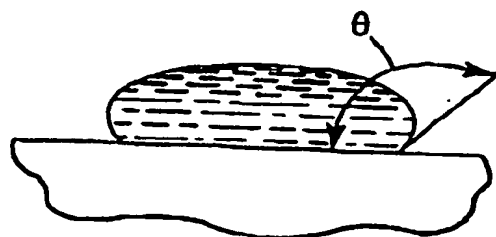


Fig. 3b

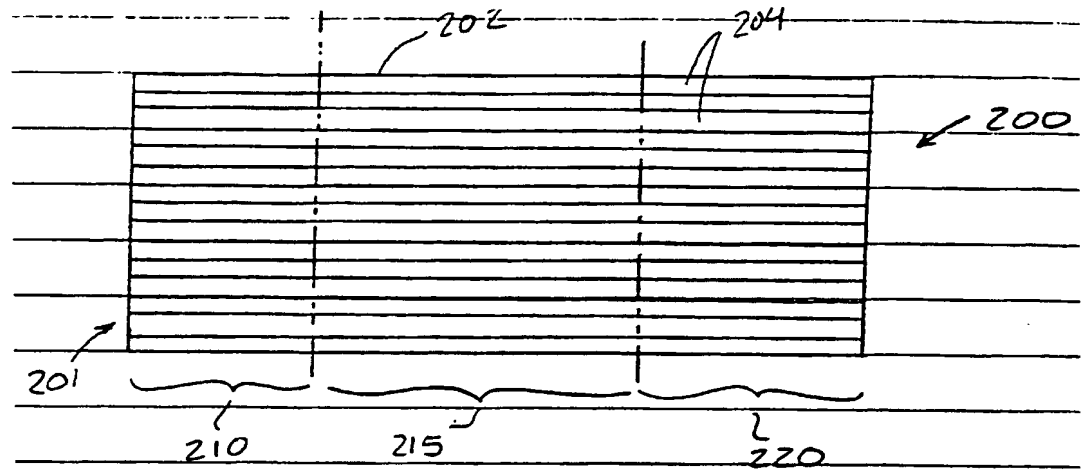


Fig. 4

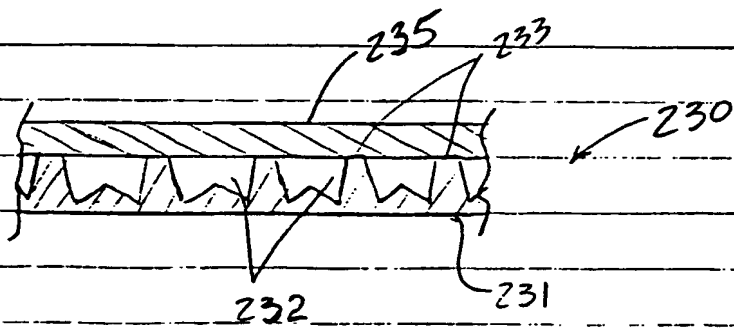


Fig. 5

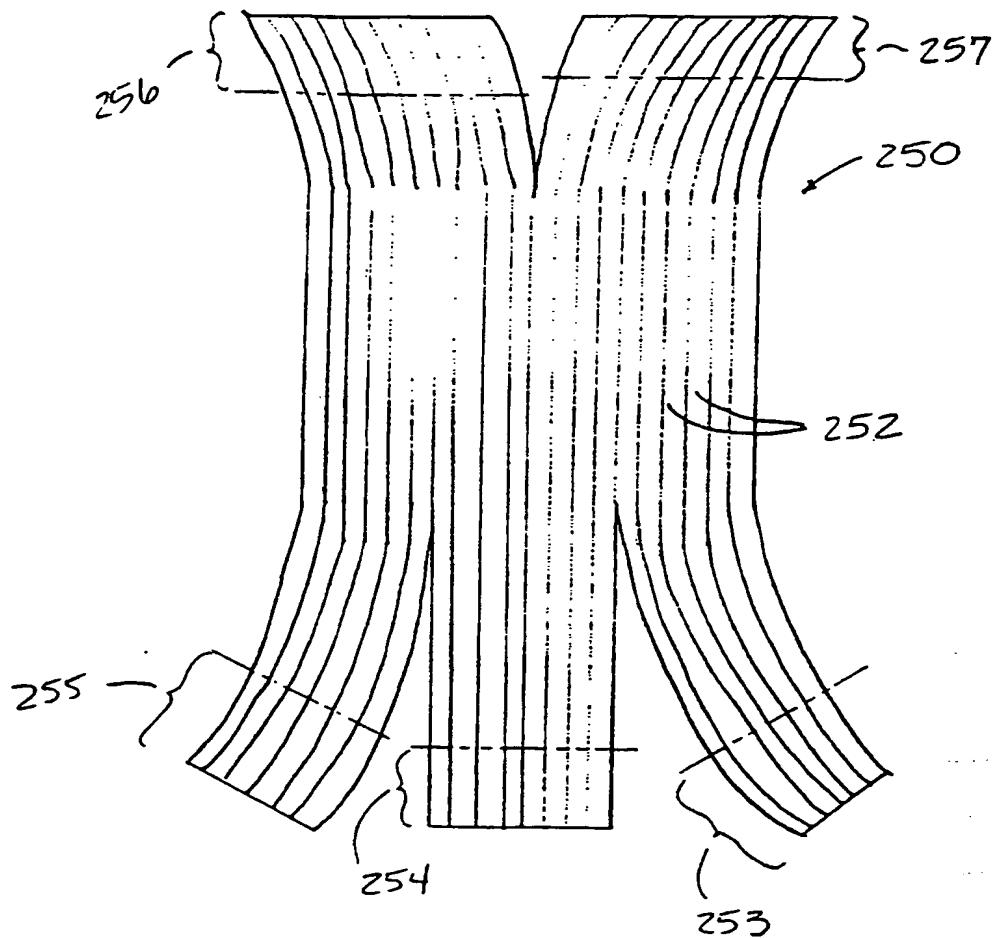


Fig. 7

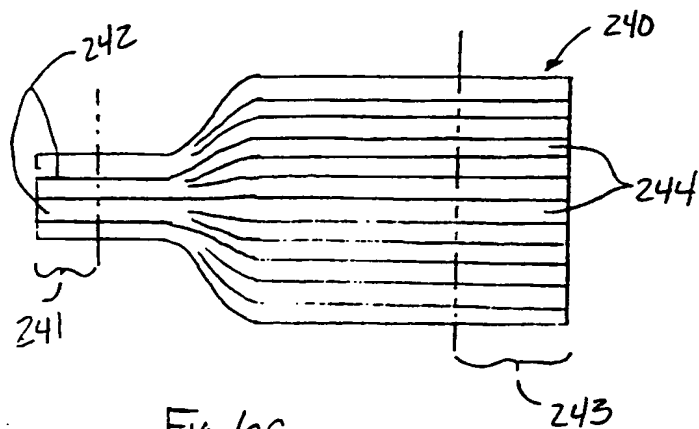


Fig. 6c

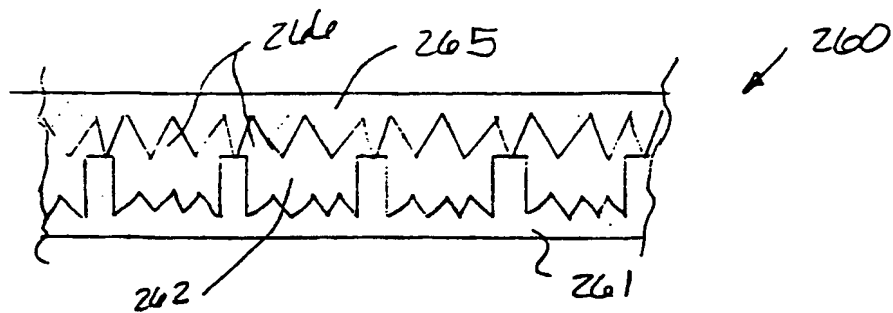


Fig. 8

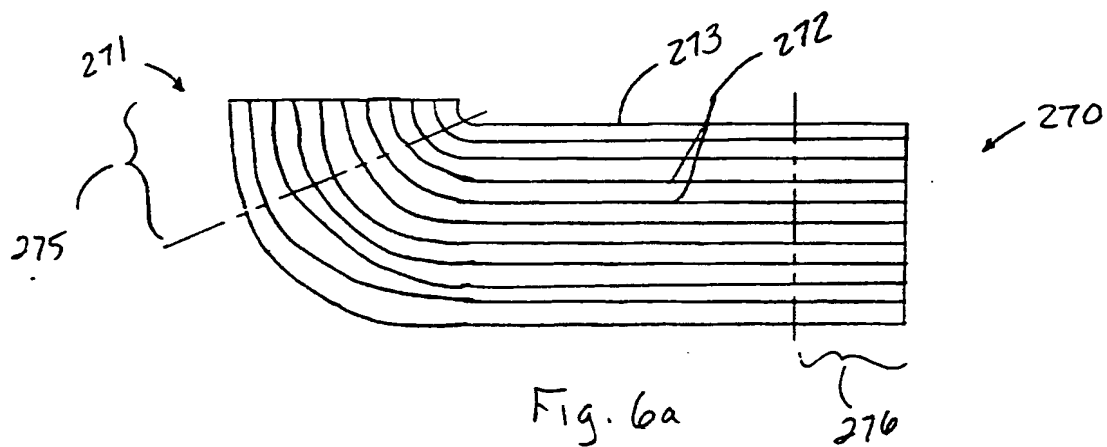


Fig. 6a

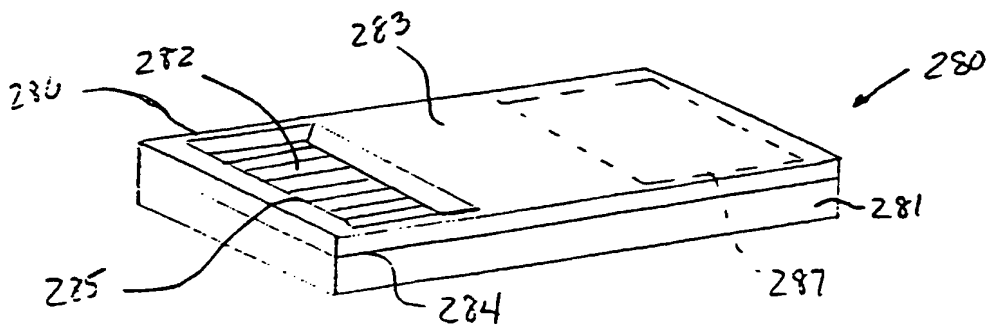


Fig. 6b

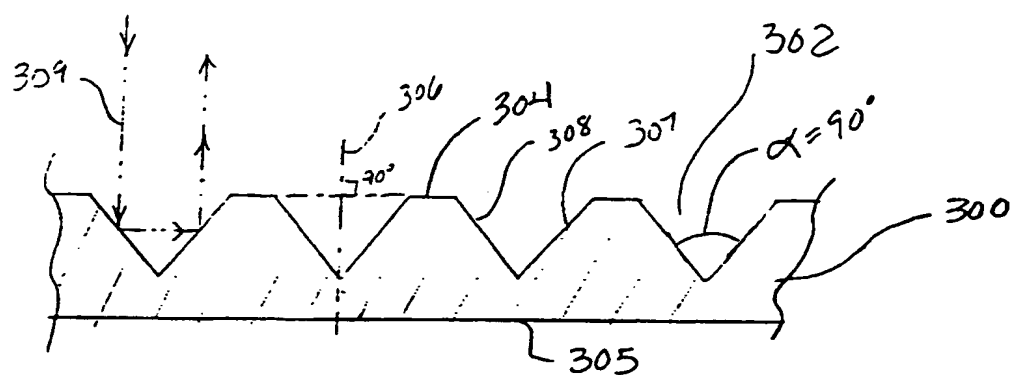


Fig. 9

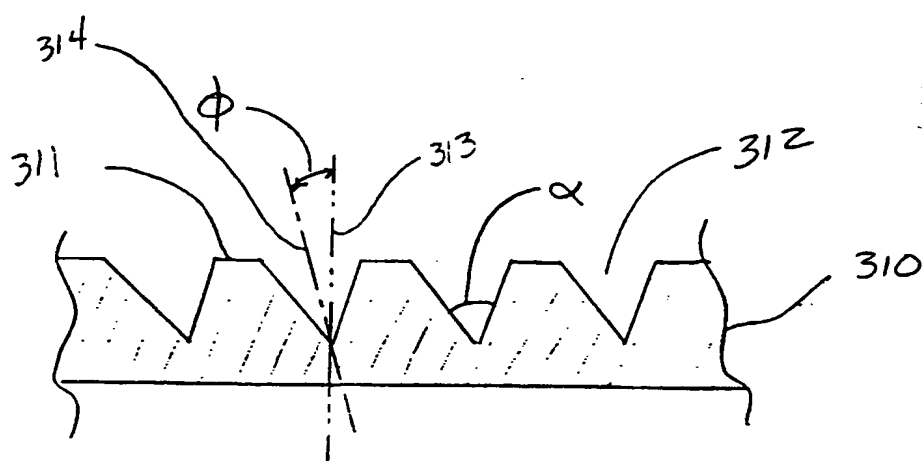


Fig. 10a

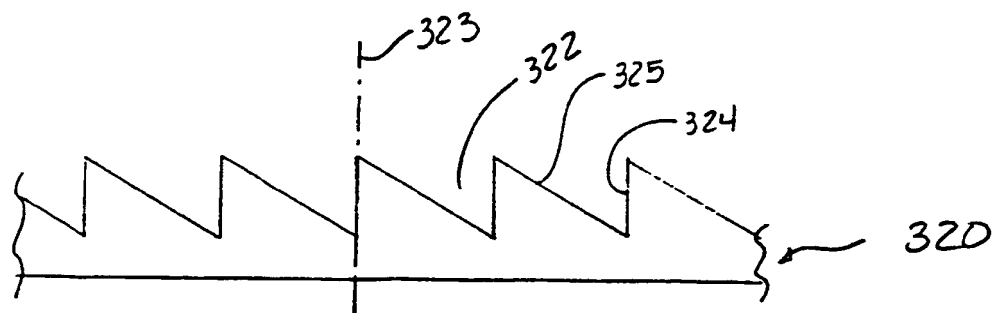


Fig. 10b

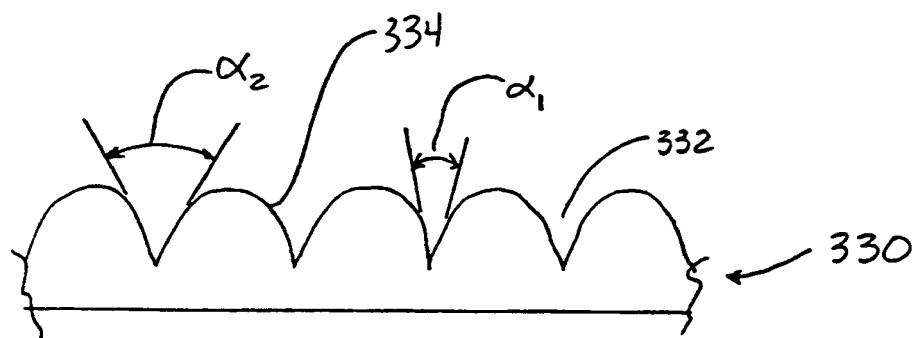
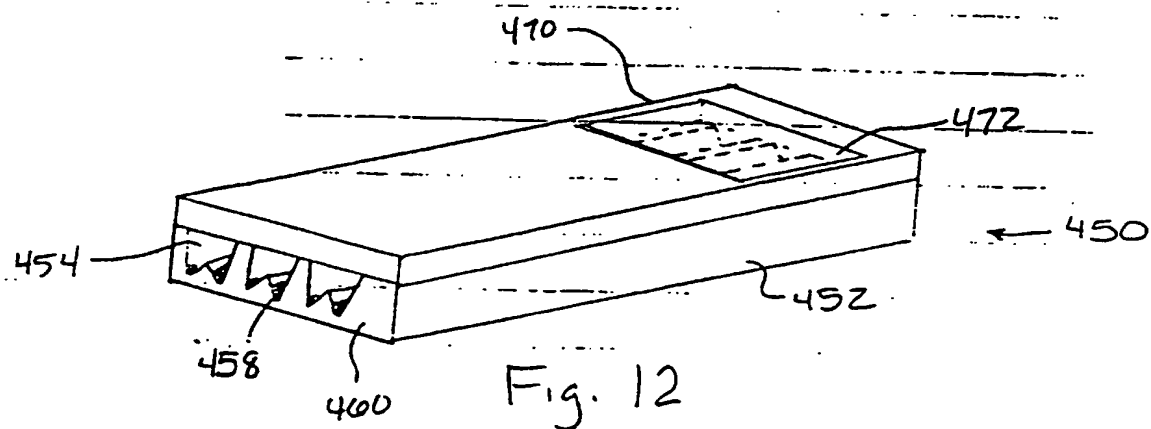
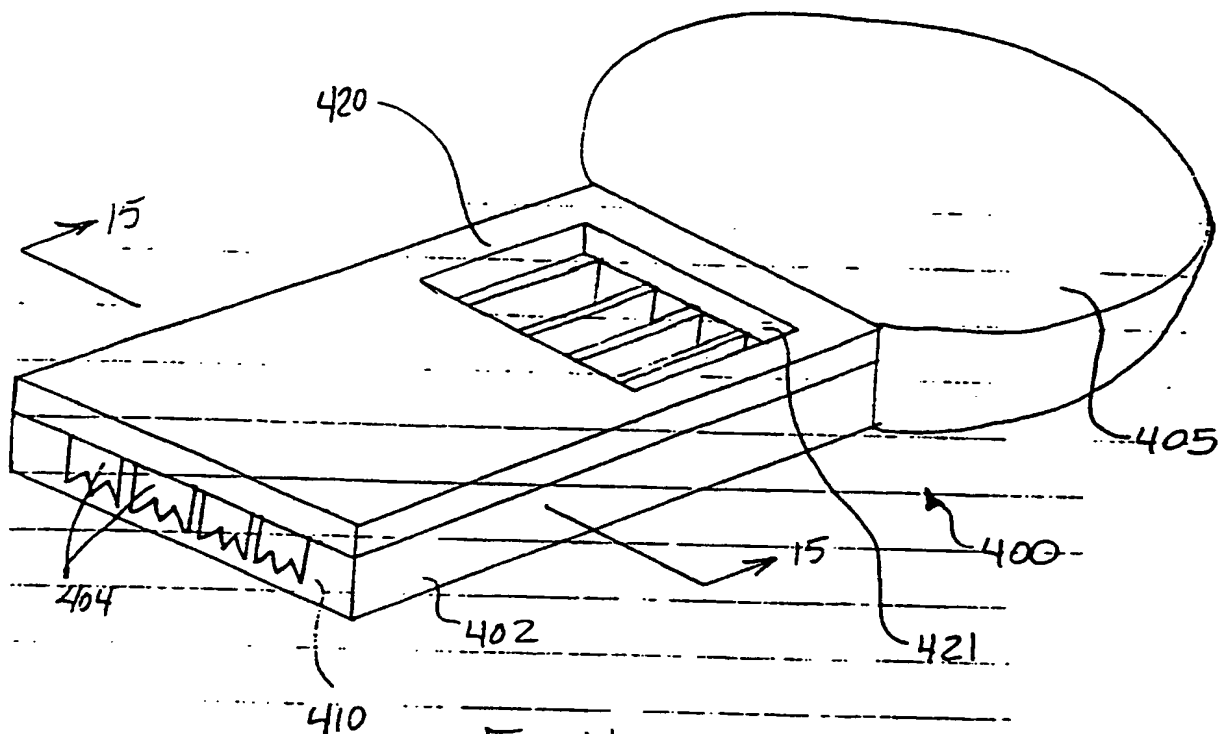
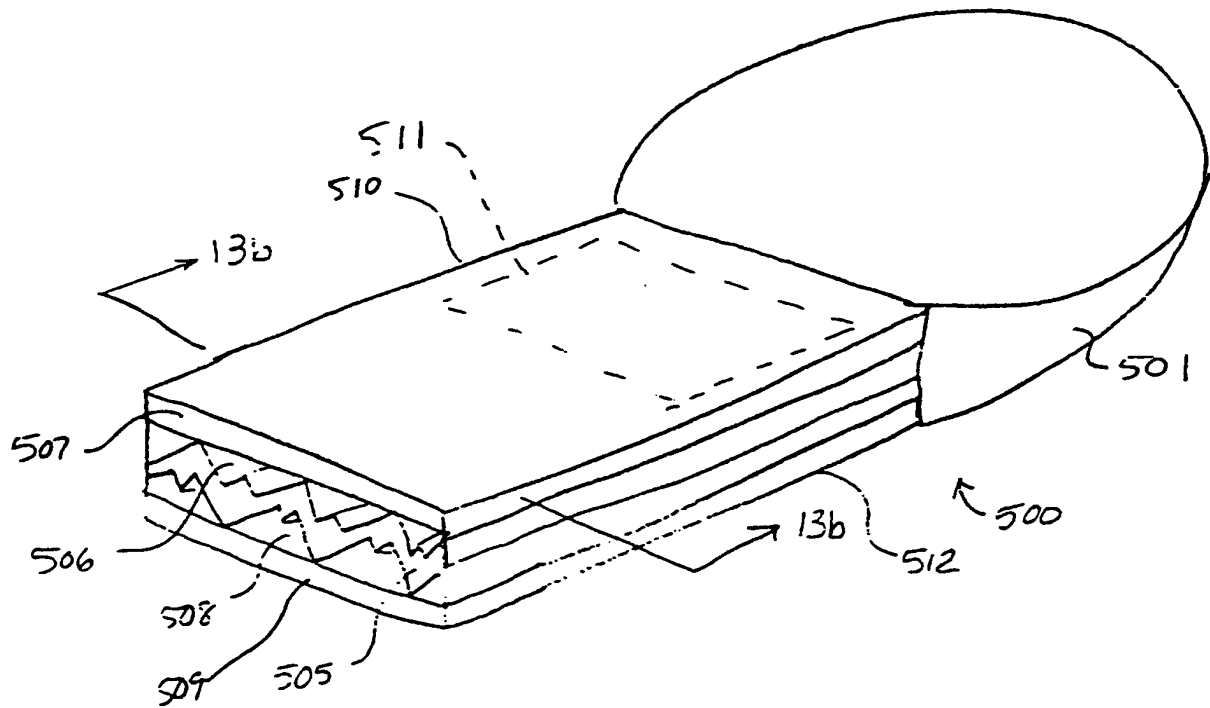
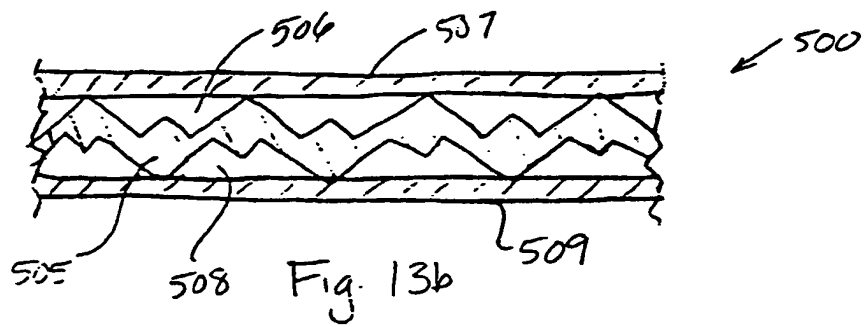


Fig. 10c





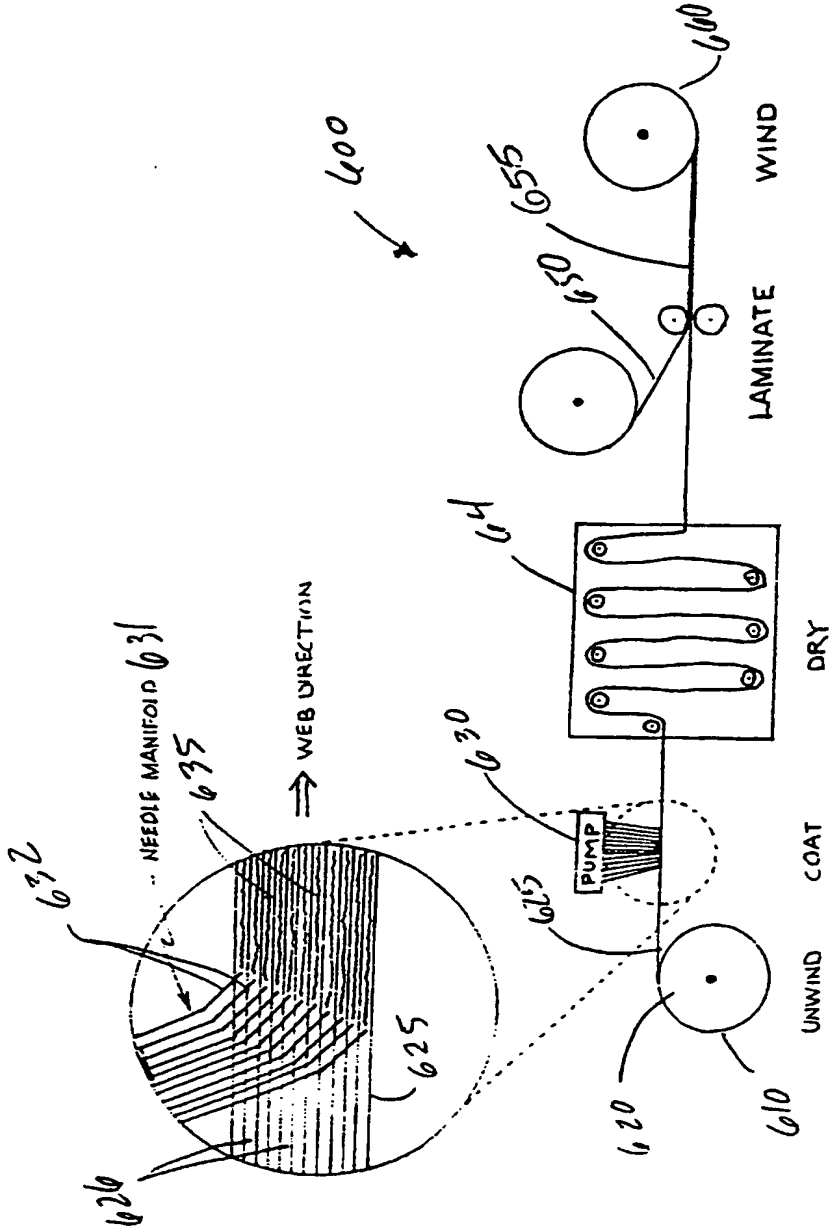
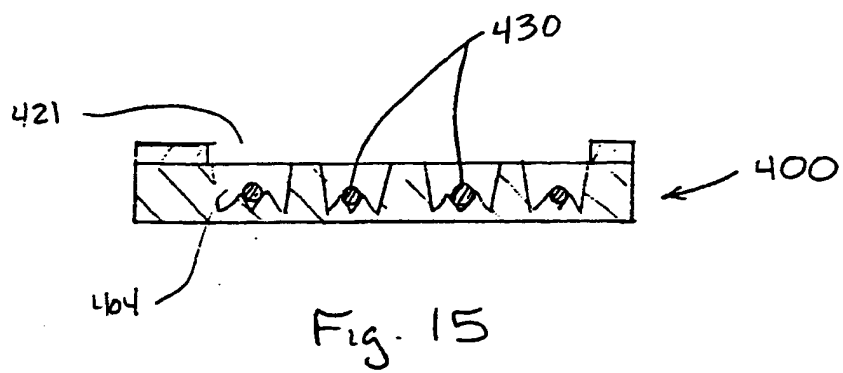


Fig. 14



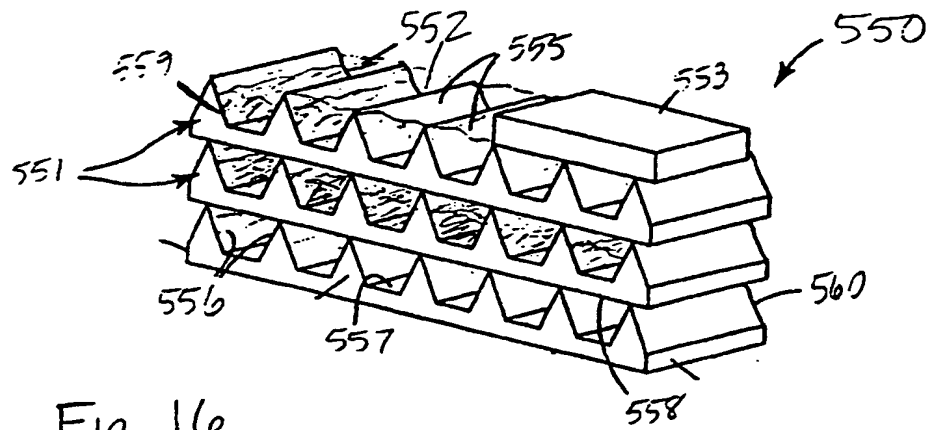


Fig. 16

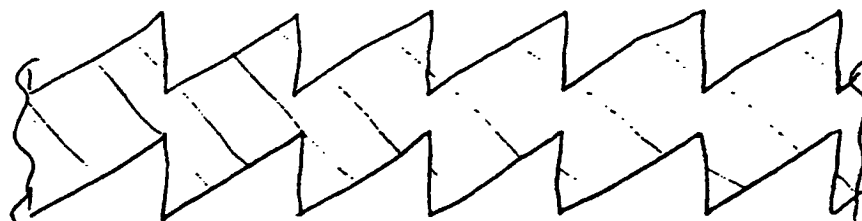


Fig. 17a.

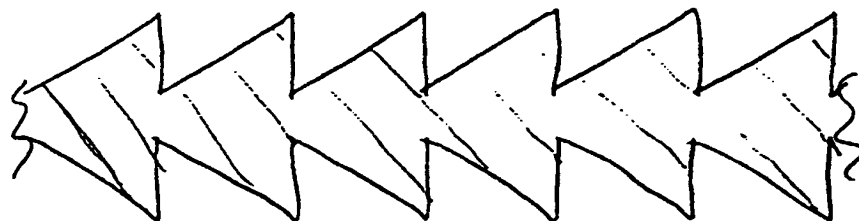


Fig. 17b

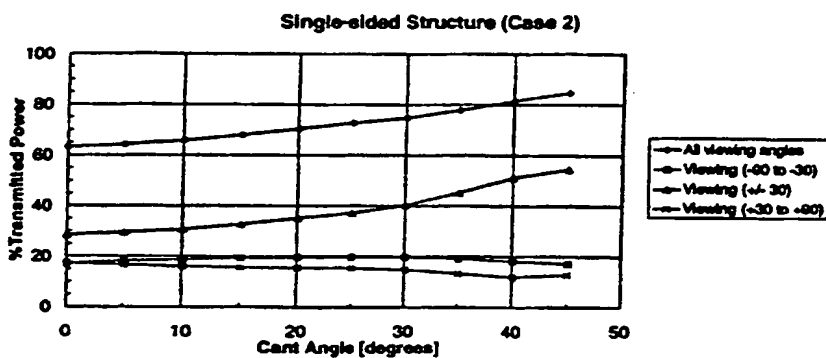


Fig 18a

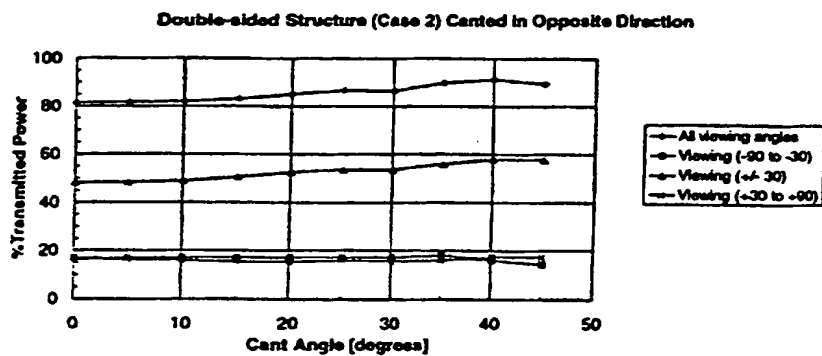


Fig 18b

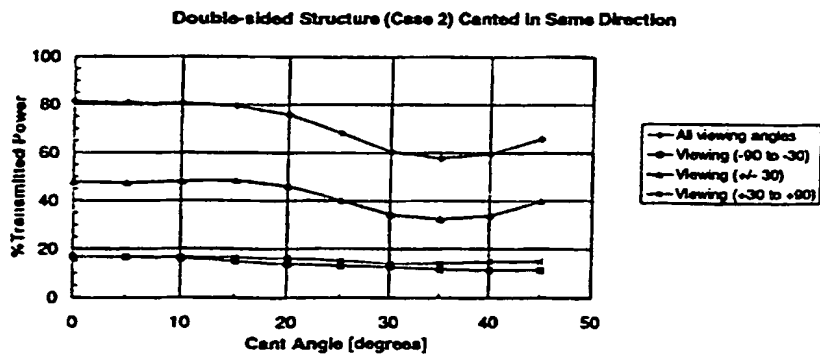


Fig 18c

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(71) Applicant: **3M INNOVATIVE PROPERTIES COMPANY** [US/US]; 3M Center, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU (utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

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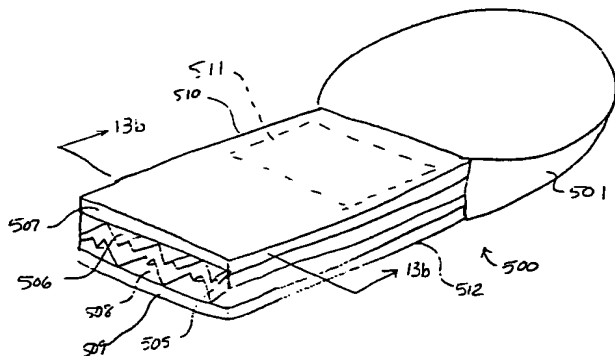
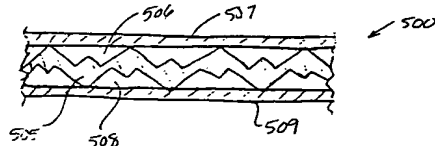
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[Continued on next page]

(54) Title: **DETECTION ARTICLE HAVING FLUID CONTROL FILM WITH CAPILLARY CHANNELS**



(57) Abstract: A detection article including at least one fluid control film layer having at least one microstructured major surface with a plurality of microchannels therein. The microchannels configured for uninterrupted fluid flow of a fluid sample throughout the article. The film layer including an acquisition zone wherein portions of the plurality of microchannels draw the fluid sample into the plurality of microchannels through openings in the microchannels at least by spontaneous fluid transport. The film layer also including a detection zone in uninterrupted fluid communication with the acquisition zone along the microchannels with the detection zone including at least one detection element that facilitates detection of a characteristic of the fluid sample within at least one microchannel of the detection zone. The detection article may be formed from a plurality of film layers that are stacked to form a three-dimensional article. The detection zone may include a plurality of detection elements, which may be all the same, may be all different or may have some different and some the same. In addition, the detection elements may be variations of the same element. The detection elements may include hardware devices, assay reagents and/or sample purification materials.

WO 01/02093 A3



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PC S 00/18616

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B01L3/00

//B01J19/00,C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01L C12Q B01J G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 195 41 266 A (BAYER AG ;KARLSRUHE FORSCHZENT (DE)) 7 May 1997 (1997-05-07) column 2, line 37 -column 2, line 68 column 3, line 30 -column 3, line 35 column 4, line 35 -column 4, line 68 column 6, line 16 -column 7, line 41 column 7, line 58 -column 8, line 24 column 8, line 42 -column 8, line 68 column 11, line 32 -column 12, line 11 figures 1-6,8-10 -/--	1-10,14, 16,19, 26-30, 32,33, 43,51, 53,54, 60,61, 67,68, 70-72, 74-76, 81,83-95

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Fax: (+31-70) 340-3016

Authorized officer

Koch, A

INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>--- US 5 399 486 A (CATHEY CHERYL A ET AL) 21 March 1995 (1995-03-21)</p> <p>column 1, line 56 -column 2, line 59 column 3, line 50 -column 5, line 9 column 5, line 40 -column 7, line 30 column 7, line 51 -column 8, line 18 column 8, line 40 -column 9, line 65 figures 1-5</p>	<p>1-5,14, 16,19, 26-30, 32,33, 43,53, 54,60, 61,67, 68, 70-72, 74-76, 81,83-95</p>
A	<p>--- US 5 152 060 A (BICHLER PETER ET AL) 6 October 1992 (1992-10-06)</p> <p>column 1, line 10 -column 1, line 20 column 2, line 29 -column 2, line 32 column 2, line 57 -column 3, line 59 figures 1-7</p>	<p>28,29, 81-84, 86,92-95</p>
Y	<p>--- US 4 233 029 A (COLUMBUS RICHARD L) 11 November 1980 (1980-11-11) column 1, line 58 -column 2, line 38 column 3, line 48 -column 4, line 52 column 7, line 45 -column 7, line 61 column 9, line 14 -column 9, line 62 column 10, line 32 -column 10, line 68 figures 1-9</p>	<p>6,7,43, 51</p>
Y	<p>--- WO 92 08972 A (ABBOTT LAB) 29 May 1992 (1992-05-29) page 2, paragraph 3 -page 6, paragraph 4 page 14, paragraph 2 -page 19, paragraph 5 figures 3,1,2,4 -----</p>	<p>8-10</p>

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/18616

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-95

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-95

A detection article with fluid control film layer having at least one surface with a plurality of microchannels for uninterrupted fluid flow between a sample acquisition and a sample detection zone by spontaneous fluid transport, a method for analyzing a sample by means of this detection article, and a method of fabricating this detection article.

2. Claims: 96-100

A microfluidic article with enhanced optical transmission, comprising at least one fluid control layer having at least one surface with a plurality of microchannels configured for enhanced transmission by canting of an included angle of the channel walls relative to the line normal to the microstructured surface.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC S 00/18616

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19541266 A	07-05-1997	CA 2236666 A WO 9717130 A EP 0859660 A JP 11514574 T	15-05-1997 15-05-1997 26-08-1998 14-12-1999
US 5399486 A	21-03-1995	CA 2156412 A EP 0686198 A JP 8507210 T WO 9419484 A US 5503985 A US 5660993 A US 5698406 A US 5798215 A	01-09-1994 13-12-1995 06-08-1996 01-09-1994 02-04-1996 26-08-1997 16-12-1997 25-08-1998
US 5152060 A	06-10-1992	DE 3709278 A AT 75980 T WO 8806941 A EP 0391895 A JP 2854309 B JP 3500861 T US 5249359 A	29-09-1988 15-05-1992 22-09-1988 17-10-1990 03-02-1999 28-02-1991 05-10-1993
US 4233029 A	11-11-1980	AT 4249 T AT 1366 T CA 1119831 A CA 1129498 A CA 1133059 A DE 2963436 D DE 2964110 D DE 2965945 D EP 0014797 A EP 0010456 A EP 0010457 A JP 1196515 C JP 55059326 A JP 58026968 B JP 55074462 A JP 1248146 C JP 55071942 A JP 59021501 B	15-08-1983 15-08-1982 16-03-1982 10-08-1982 05-10-1982 16-09-1982 30-12-1982 25-08-1983 03-09-1980 30-04-1980 30-04-1980 21-03-1984 02-05-1980 06-06-1983 05-06-1980 16-01-1985 30-05-1980 21-05-1984
WO 9208972 A	29-05-1992	AU 9064391 A CA 2100365 A EP 0557433 A US 5248479 A	11-06-1992 17-05-1992 01-09-1993 28-09-1993

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